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Spin splitting of the conduction band of the ferromagnetic semiconductor EuO

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EuO is a semiconductor with a band gap of 1.2 eV and is one of the rare ferromagnetic oxides. It becomes metallic below its Curie temperature of 69 K via a spectacular metal-insulator transition: the resistivity drops by as much as 8 orders of magnitude. Moreover EuO shows giant Kerr rotations and colossal magnetoresistance which is much more extreme than in the manganates.
We have applied a new combination of spin-resolved photoemission, resonant-Auger and x-ray absorption measurements to determine the spin-polarized occupied and unoccupied density of states in EuO. These experiments revealed large changes over a wide energy range in the unoccupied density of states when varying the temperature across Tc. Moreover we clearly observed a splitting of 0.5 eV between the spin-up and spin-down conduction band. These results show that electron doped EuO in the ferromagnetic state will have charge carriers with a 100% spin-polarization.